



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/630,658	07/31/2003	Thomas A. Taylor	CS-21320	9490
7590	05/24/2005		EXAMINER	
PRAXAIR, INC.			BAREFORD, KATHERINE A	
LAW DEPT - M1557			ART UNIT	PAPER NUMBER
39 OLD RIDGEBURY ROAD				
DANBURY, CT 06810-5113			1762	

DATE MAILED: 05/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No.	Applicant(s)
	10/630,658	TAYLOR, THOMAS A.
	Examiner	Art Unit
	Katherine A. Bareford	1762

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

1) Responsive to communication(s) filed on 28 April 2005.

2a) This action is **FINAL**.                                    2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

4) Claim(s) 1-21 is/are pending in the application.

4a) Of the above claim(s) 14-20 is/are withdrawn from consideration.

5) Claim(s) \_\_\_\_\_ is/are allowed.

6) Claim(s) 1-13 and 21 is/are rejected.

7) Claim(s) \_\_\_\_\_ is/are objected to.

8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All    b) Some \* c) None of:

1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

1) Notice of References Cited (PTO-892)

2) Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_

4) Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_

5) Notice of Informal Patent Application (PTO-152)

6) Other: \_\_\_\_\_

## DETAILED ACTION

The amendment of April 28, 2005 has been received and entered.

### *Election/Restrictions*

1. Applicant's election with traverse of Group I, claims 1-13 (and new claim 21) in the reply filed on April 28, 2004 is acknowledged. The traversal is on the ground(s) that distinctness must be shown between the two groups in this case, and this is not done because the coated articles of Group II are produced by the methods of Group I. This is not found persuasive because while the claims of Group II are product-by-process claims, the patentability of such claims is not determined by the method of production, but rather by the product itself (see MPEP 2113). As a result, the products as claimed can be made by a materially different process, such as thermal spraying without a gas shield while holding the spray device closer to the substrate. Therefore, the two different sets of inventions meet the requirements for distinctness.

The requirement is still deemed proper and is therefore made FINAL.

2. Claims 14-20 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on April 28, 2005.

3. This application contains claims 14-20 drawn to an invention nonelected with traverse in the reply filed on April 28, 2005. A complete reply to the final rejection must include cancellation of nonelected claims or other appropriate action (37 CFR 1.144) See MPEP § 821.01.

*Claim Objections*

4. The objection to claim 9 because the second comma should be removed after "argon" at line 2 for grammatical clarity is withdrawn due to the removal of the second comma in the amendment of April 28, 2005.

*Claim Rejections - 35 USC § 112*

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claim 21 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 21, lines 2-3, "non-reactive materials" is indefinite and confusing as worded, because it is unclear what the materials must be non-reactive to. Must they be non-reactive to all other materials, or just to oxidation or oxidation and nitridation? The

Examiner also notes that as to the phrase “ceramics, oxides, nitrides, carbides” that “ceramics” is inclusive of “oxides”, “carbides” and “nitrides”.

*Claim Rejections - 35 USC § 103*

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1-6, 9-11 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zurecki et al (US 5738281) in view of Nowotarski et al (US 5486383).

Zurecki teaches a method of placing a gas shroud around a turbulent gas jet. Column 1, lines 5-15. This method can be used in spraying applications, such as thermal spray coating. Column 4, lines 15-25. A jet exits from an orifice of the thermal spray device and is surrounded with a coaxial gas shield having a shield gas flow substantially surrounding the effluent of the thermal spray device. Column 3, lines 1-

25. By using an inert surrounding gas, when thermal spraying, the amount of oxygen aspirated into the jet is reduced, thus minimizing the oxidation of the sprayed coating material and providing a desired microstructure of a coating with minimized oxidation of the coating material as supplied. Column 4, lines 15-25. As shown by Example 3, oxygen concentration in the spray jets of shrouded spray devices of Zurecki can be well

over 50% less than for unshrouded jets at the same standoff distance (3 inches). Column 9, lines 45-55 and column 11, lines 10-60, note, for example, in run no. 2, for example, with no shroud gas flow, the first or 0 flow rate, oxygen conc. is 14.0, going down to 2.1 as the flow rate of the shroud gas is increased (Table 2).

Claim 3: As shown by Example 3, oxygen concentration in the spray jets of shrouded spray devices of Zurecki can be well over 50% less than for unshrouded jets at the same standoff distance (3 inches). Column 9, lines 45-55 and column 11, lines 10-60, note, for example, in run no. 2, for example, with no shroud gas flow, the first or 0 flow rate, oxygen conc. is 14.0, going down to 2.1 as the flow rate of the shroud gas is increased (Table 2).

Claim 4, 5: the gas flow can be essentially turbulent. Column 3, lines 5-30 (the spray effluent from the spray device is turbulent, and the shroud gas is entrained in that flow).

Claim 9: the shield (shroud) gas can be nitrogen. See column 11, lines 10-60. Zurecki teaches all the features of these claims except (1) that the resulting effect on microstructure will allow an extended standoff distance for the same microstructure, (2) that the material to be sprayed is a ceramic oxide (claim 2, 6, 11, 21) which would be not sensitive to oxidation or nitridation (claim 1) and (3) that the shield gas is argon (claim 10).

However, Nowotarski teaches that when thermal spraying a turbulent fluid stream is ejected from a spray nozzle. Column 3, lines 20-60. The stream can carry

coating material which can be metals, alloys, oxides, ceramics, and other materials.

Column 3, lines 20-65. Nowotarski teaches the desire to surround the stream with a shielding gas flow of an inert gas such as nitrogen, argon, etc. See column 3, line 60 through column 4, line 40. The use of this shielding gas prevents oxygen from entering the spray stream so that oxidation or contamination or degradation of materials is

minimized. Column 4, lines 20-35. The amount of shielding fluid <sup>used</sup> ~~used~~ is such that the oxygen level at the point of impact can be less than 1%. Column 4, lines 25-35.

Nowotarski teaches that by reducing the oxygen level, the standoff distance can be increased. Column 7, lines 35-55.

It would have been obvious to one of ordinary skill in the art at the time the invention <sup>was</sup> ~~is~~ made to modify Zurecki to increase the standoff distance for the same microstructure as suggested by Nowotarski in order to provide a desirable coating, because Zurecki teaches that the use of the coaxial shielding gas provides a decreased oxygen level in the spray stream for a given distance, thus reducing oxidation of the applied coating (that is, providing a desired microstructure of limited further oxidation) and Nowotarski teaches that the use of shielding gas that provides a decreased oxygen level in the spray stream for a given distance can allow an increased standoff distance, and that the shielding gas can be used to reduce oxidation, contamination or degradation of the material (again providing a desired microstructure). This provides a longer standoff distance to get the same microstructure as without shielding, because the resulting microstructure provided by the presence of a first amount of oxygen will

not occur until a longer standoff distance when shielding is used since that first amount of oxygen will be present in the stream a much greater distance (more than 50 % as shown by Zurecki) from the nozzle. It would further have been obvious to modify Zurecki to perform the spraying with ceramic oxides, which would be materials not sensitive to oxidation or nitridation, as taught by Nowotarski with an expectation of desirable coating results, because Nowotarski teaches the desire to shield coatings of ceramics and oxides as well as metals, as the shield also prevents contamination. It would further have been obvious to modify Zurecki to perform the shielding with argon as taught by Nowotarski with an expectation of desirable coating results, because Zurecki teaches the desire to shield with an inert gas, such as nitrogen, and Nowotarski teaches the desire to shield coating sprays with inert gases, which can include argon as well as nitrogen.

9. Claims 7-8 and 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zurecki in view of Nowotarski as applied to claims 1-6, 9-11 and 21 above, and further in view of the admitted state of the prior art.

Zurecki in view of Nowotarski teaches all the features of these claims except (1) that the ceramic oxide is zirconia (claims 7, 12) and (2) that multiple layers of coating material are provided (claims 8, 13).

However, the admitted state of the prior art, at pages 4-5, teaches that it is well known to apply ceramic coatings by thermal spraying. These ceramic coatings can include thermal barrier coatings. The thermal barrier coatings are often multilayer

coatings with a metallic bond coat followed by a ceramic top coat. The ceramic top coat is usually based on zirconium oxide (zirconia). The metallic bond coat can also be applied by thermal spraying.

It would have been obvious to one of ordinary skill in the art the time the invention was made to modify Zurecki in view of Nowotarski to apply a zirconia coating and to apply a multilayer coating such as a thermal barrier coating of metallic bond coat followed by ceramic top coat as suggested by the admitted state of the prior art with an expectation of providing a desirable coating, because Zurecki in view of Nowotarski teaches a gas shielding system for thermal spraying that can be used with metals or ceramic oxides and the admitted state of the prior art teaches that when thermal spraying a desirable coating system to apply is metal bond coats followed by zirconia top coats.

*Response to Arguments*

10. Applicant's arguments filed April 28, 2005 have been fully considered but they are not persuasive.

Applicant argues that gas shields known in the art are used to prevent or reduce the oxidation of reactive materials such as metals during deposition, and it would not be thought to use when spraying with materials not sensitive to oxidation or nitridation. Applicant argues that they, however, have discovered other benefits to using a such a shield when spraying the non-sensitive materials, and that when doing

this spraying increased standoff can be used without degradation of microstructures or other properties of the coating. Applicant argues that Zurecki uses the shrouding gas to protect the spray from reaction with ambient gases, and does not suggest spraying a non-sensitive materials as claimed or the increased standoff distance as claimed. As to Nowotarski, applicant argues that the secondary reference adds nothing to make up for the deficiencies of Zurecki, as it does not disclose or suggest the use of a shrouding gas in thermal spraying of non-sensitive materials, or that the standoff distance can be lengthened as claimed.

W<sup>1</sup>C The Examiner has reviewed these arguments, however, the rejection is maintained. While Zurecki does not teach using the shrouding gas to spray non-sensitive materials as claimed or increase the standoff distance as claimed, the Examiner has cited the secondary reference to Nowotarski as to these features. Nowotarski teaches the use of a shrouding gas to minimize oxidation or contamination or degradation of materials being sprayed (column 4, lines 20-25). As a result Nowotarski indicates that other benefits of using the shrouding gas can be to minimize defects <sup>from</sup> "contamination" or "degradation" of the materials as well as preventing oxidation. In fact Nowotarski specifically teaches that plastics, ceramics and oxides can be sprayed by this process (column 3, lines 55-65) and these materials would be materials that are not sensitive to oxidation or nitridation. As to the standoff distance increase, Nowotarski clearly indicates that by reducing the oxygen level that enters the spray stream, standoff distance can be increased. See column 7, lines 35-55 and the discussion in the rejection

above. As a result, the suggestion of using the shrouding gas to spray non-sensitive materials as claimed and to increase the standoff distance as claimed is found in the combination of Zurecki and Nowotarski.

*Conclusion*

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Katherine A. Bareford whose telephone number is (571) 272-1413. The examiner can normally be reached on M-F(6:00-3:30) with the First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9306 for regular communications and for After Final communications.

Other inquiries can be directed to the Tech Center 1700 telephone number at (571) 272-1700.

Furthermore, information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



KATHERINE BAREFORD  
PRIMARY EXAMINER